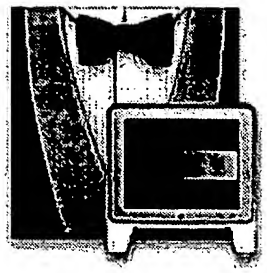
EXHIBIT A

34 PAGES follow



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Introduction

Welcome to SuperCal - the only visual calibrator capable of properly calibrating LCDs and projectors, as well as good old CRTs. SuperCal creates a ColorSync profile which corrects the response of your display to make it look its best. This means you will see more accurate colors, smoother gradients and cleaner, anti-aliased text. Mac OS X and Aqua never looked so good!

Registration

SuperCal is shareware. It is NOT free. This means that you can download SuperCal and try it out for free, but if you continue to use it, you should pay the registration fee.

SuperCal costs US **$19** for a single user license. You can register your copy of SuperCal at the Kagi Shareware service at https://order.kagi.com/?9KE. Kagi Shareware accepts credit card registrations on-line, by email or by snail-mail, and also accepts various currencies and checks drawn on US banks. For companies, they also handle invoices.

System Requirements

Mac OS X

- Mac OS X 10.0 or later
- Color display capable of 24-bit (millions) or 16-bit (thousands) color

Mac OS 9

- Mac OS 9.0 or later
- ColorSync 3.0 or later
- CarbonLib 1.4 or later (CarbonLib can be downloaded from Apple at http://www.info.apple.com/support/downloads.html)
- Color display capable of 24-bit (millions) or 16-bit (thousands) color

Installation

Mac OS X

It is recommended that you install SuperCal in the "Applications" folder so that it is accessible to all users, but SuperCal can be installed anywhere on your system, if you prefer. Simply drag and drop the SuperCal folder to the destination folder of your choice.

Mac OS 9

It is recommended that you install SuperCal in the "Applications (Mac OS 9)" folder, but SuperCal can be installed anywhere on your system, if you prefer. Simply drag and drop the SuperCal folder to the destination folder of your choice.

Important Fixes

We have discovered a mistake in the display color data for certain displays in recent versions of SuperCal. The color data was not properly adapted to the D50 illuminant of the profile connection space, and as a result, ColorSync-aware applications such as Photoshop may report the profiles as defective. The mistake will only be apparent if you use the profiles in ColorSync-aware applications.

Please update your profiles if you meet one of the following criteria:

- You own a PowerBook G4 DVI, and LCD iMac or an eMac and you made a profile with SuperCal 1.1 or 1.1.1.
- You made profiles with SuperCal 1.1b1 and have not updated them yet with SuperCal 1.1b2 or newer.
- You made a profile for a display that was not listed in the display colors list, but an application update provided a new entry in the list for your display.

Updating your profiles is very easy to do and does not require you to repeat any of your measurements. The following steps will update the tristimulus data while leaving your previous calibration data intact.

1. Launch SuperCal.
2. In Step 2, select the existing profile.
3. Skip over the subsequent measurement steps and go to Step 10. The measurement data from the existing profile will be left untouched. It's a good idea to confirm that your white point and target gamma are still set properly as you step through steps 8 and 9.
4. In Step 10, re-select the model of your display.
5. In Step 11, save your profile, replacing the existing profile.

If you have more than one profile, repeat these steps for each of the profiles you have created with SuperCal.

Your profile(s) will now have the correct display color data in it. This technique will be useful in the future as we improve the improve the accuracy of the color data and include new display models that are not listed in the latest version of SuperCal.

For a complete list of fixes to the current version, be sure to check out the version history at the end of this manual.

Known Issues

Black Level and Response Measurement do not work like expected

This was an unfortunate problem that ocurred on certain video cards under Mac OS 9, but it has been fixed (we hope). We discovered that under Mac OS 9.x, some systems incorrectly reported that the video hardware had a 2 byte-per-entry gamma table instead of a 1 byte-per-entry gamma table. To our knowledge, this problem has not occured on any systems under Mac OS X. ColorSync display profiles are identical between OS 9 and OS X, so if something like this should ever occur again, you can boot into the second system (which hopefully won't exhibit the same problem), build a profile, then copy it back over to the first system. Again, this should be fixed as of version 1.1.2.

Calibrating multiple monitors

SuperCal is not yet multiple-monitor aware, but it can be used in a multiple-monitor configuration. SuperCal currently operates on the non-mirrored, main display which is the display containing the menu bar. In order to calibrate a secondary display, use the Monitors control panel (under Mac OS 9) or Display panel in the System Preferences (under Mac OS X) to move the menu bar to the secondary display to make it the main display, then run SuperCal again. You may need to restart after changing the main display because not all systems update their configuration properly after re-arranging displays. For example, there appears to be a bug in Mac OS X 10.0 thru 10.1 on a PowerBook using the external video that does not update the video configuration properly after a display arrangement change. In this case, a restart is required for the video hardware to configure itself properly.

You cannot calibrate with video mirroring turned on. However, you can calibrate and generate a profile for each display individually, then turn mirroring on and assign the each profile to its respective display using the Monitors control panel (under Mac OS 9) or Display panel in the System Preferences (under Mac OS X).

Changing display settings while calibrating

SuperCal is not Display Manager aware, so changes in display settings (like color depth and resolution) while the application is running is not suggested. If you need to change these settings when calibrating, quit SuperCal, make the changes, then relaunch the application.

Expert Mode

Currently, the "Expert Mode" is always on (the checkbox on the black level screen cannot be activated). This means that you will be required to measure each individual color channel for now. This is the more accurate way to build a profile, but we understand that some users would like a better looking display without going through a full measurement, so we will enable a single monochromatic measurement as an option in a future build.

Visual artifacts on controls in measurement screens

Native appearance controls are used on measurement screens and as a result, annoying color fringes can occur around their edges during measurements. This is purely a cosmetic issue that results from altering specific gamma table values during measurement. We will probably create custom controls in a future build to eliminate the problem.

Display Colors (chromaticity) setting

Even if you start a calibration using an existing profile, sRGB values are always chosen by default in the

display colors (chromaticity values) screen. BE SURE TO CHECK YOUR SETTING as you pass through this pane. This will be crrected in a future build. In addition, the list is relatively short. There are several ways to specify these values and we're investigating a better way than the current method of compiling a huge list of displays. Many displays use the same phosphors, so we may shorten the list to phosphor types, but this is not intuitive for many users. Like we said, we're investigating better ways of doing this.

White Balance picture

The picture in the white point adjustment is temporary. This method seems to be much more consistent than previous methods, but the picture must be updated with a better and more useful image that has some test patches. Look for this in a later build.

Chromatic adaptation

SuperCal does not yet do chromatic adaptation of the tristimulus values in the profile. The tristimulus values will be correct for the native white point, but not if you do a white balance adjustment.

Quick Start

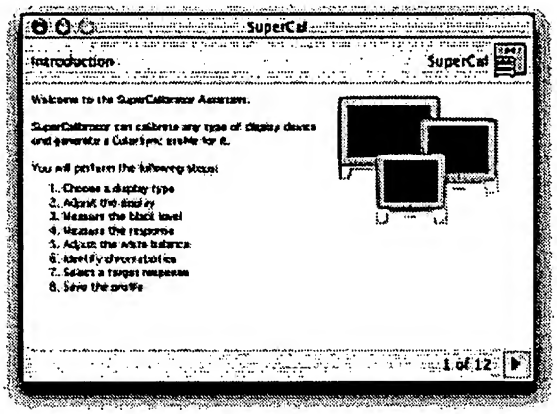
1. Launch SuperCal.
2. Choose "New Profile".
3. Select the type of display you are calibrating.
4. Select the type of controls present on your display.
5. Adjust your display settings according to the instructions.
6. Measure the black level.
7. Measure the response of each color channel.
8. Adjust the white balance, if desired.
9. Choose the desired gamma response.
10. Choose the tristimulus vales.
11. Name and save your new profile.

The Details

Step 1 - Introduction

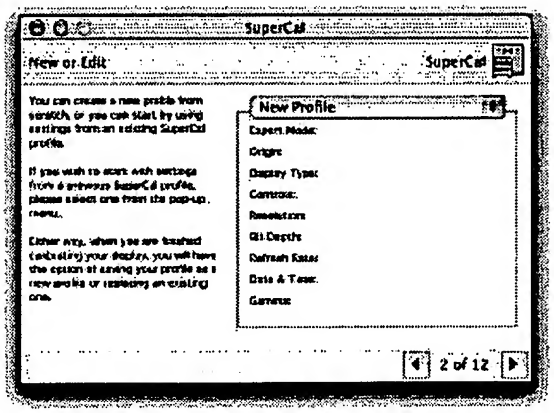
The introduction screen lists the basic steps required to build a profile.

By default, "Expert Mode" is turned on. In this mode, you will make independent measurements for each of the color channels of your display, and you will have the option of adjusting the white point. When Expert Mode is disabled, the measurement process is simplified to a single channel measurement and no white point adjustment can be performed.

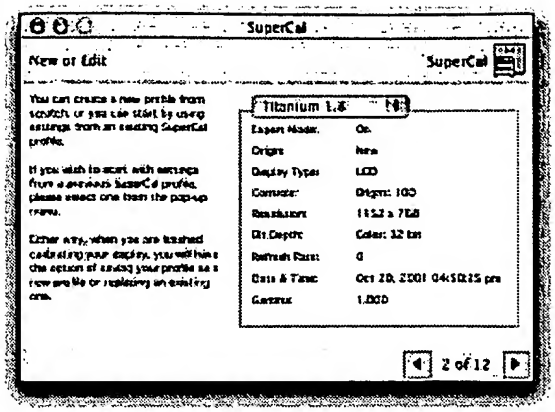


Step 2 - New or Edit

This step offers you the option of creating a new profile from scratch, or using the measurement data from an existing SuperCal profile to create a new profile.

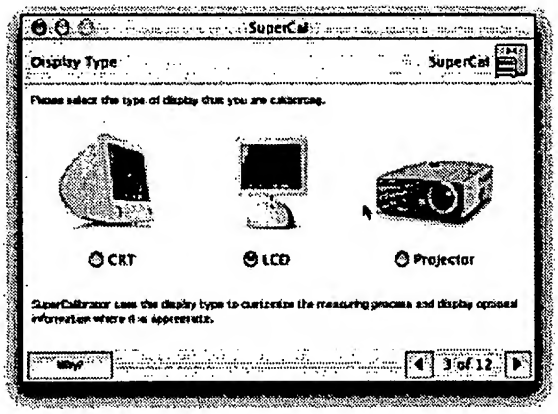


Using an existing profile is useful if you intend to re-target that profile for a new target gamma value and you don't want to go through the measurement process all over again. **Note:** If this is the first time you are using SuperCal, you will not see any items in this menu because it only displays profiles created with SuperCal. This is also useful if you need to update any of the settings in a profile. For instance, as enhancements are made to SuperCal, you can open an old profile, confirm your settings, then save a new copy of the profile, thereby updating it to the most current version. *Enhancements will most likely be made in the specification of tristimulus values for red, green, blue and the white point for the current calibration.*



Step 3 - Display Type

This step allows you to select the type of display you are calibrating so that SuperCal can alter the calibration patterns to match the characteristics of your display.

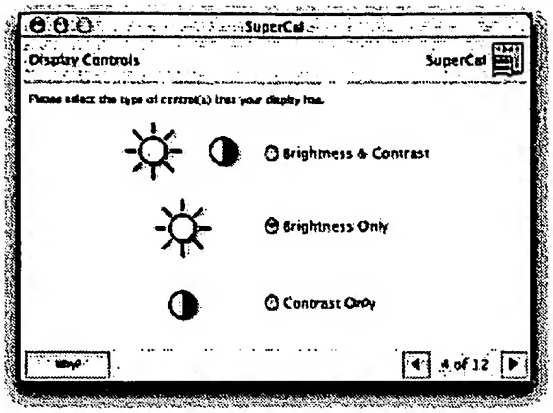


Because some displays like projectors, analog LCDs and CRTs tend to blur the pixels that are displayed, SuperCal uses larger patterns or patterns that are specifically oriented for the display type. For digital LCDs running at their native resolution that have no pixel blur, SuperCal uses smaller patterns.

Step 4 - Display Controls

This step allows you to specify the types of controls present on your display so that SuperCal can customize the subsequent control adjustment screen.

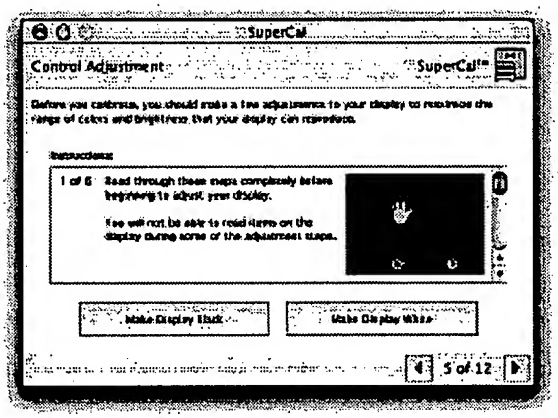
Depending on your display choice, one of the options will be pre-selected. If you chose "CRT" or "Projector", the “Brightness & Contrast” option will be pre-selected. If you chose “LCD”, the "Brightness Only" option will be pre-selected.



On displays with two controls, it is unlikely but possible for your controls to be labeled differently than "Brightness" and "Contrast". The proper terms for these two controls are "Black Level" and "Picture", respectively, but these are rarely used and "Brightness" and "Contrast" have instead become the undocumented standard.

Step 5 - Control Adjustment

This step instructs you how to adjust your display before making any measurements. The instructions are dependent on your selection in the preceding display controls screen.



Depending on your selection in the preceding display controls screen, you will see one or two buttons labeled "Make Display Black" and "Make Display White". These features are for your convenience when adjusting the brightness and contrast controls. The "Make Display Black" button will fill the display with black to make it easier to adjust the black level, or "brightness" as it is commonly called. The "Make Display White" button will fill the display with white to make it easier to adjust the picture, or "contrast" as it is commonly called. On displays that only have software controls, these features will not be very convenient or usable, but they will be handy for users with physical display controls.

First off, this is the step that is most often done incorrectly when calibrating a display, so we're going to try and describe it as clearly and concisely as we can. By properly adjusting your controls, you will maximize the contrast ratio of your display so that you can see as much information as possible in the shadows and highlights, and you will set the proper luminance (brightness or white) of the display for your ambient lighting conditions. Please note that you won't be able to make a mediocre display perfect or make the brightness high enough for all ambient viewing conditions. You will only be able to make the display as good as it can be, and may have to alter your ambient lighting conditions to compensate for any deficiencies in your display if accuracy is very important to you.

Nearly every display has at least a single control for adjusting the picture, but many displays have two controls, one for the picture and one for the black level. While most CRTs have both controls, most modern LCDs only have the picture control. And, some controls are adjusted through control panel software like those on an iMac and some have physical controls on the display itself. We only point this out in case you are not familiar with your display's controls and you need to read your display's user guide to locate its controls.

On a cautionary note, it is possible for the control labels to be swapped on a display with both controls, but it is not very likely. However, you should take the time to determine the real functions of your controls, and if the labels are indeed swapped, make a note of which control to use when prompted by the instructions. Basically, one of the controls will affect the brightness of black on your display (a 24bit RGB 0,0,0 signal from the computer) and one will affect the brightness of white (a 24bit RGB 255,255,255 signal from the computer). You should put a picture up on the display, then turn both controls down to their minimums. Pick one control, turn it up to its max and observe the change. If the picture becomes clearly visible again without the black areas becoming overly gray, you have most likely just increased the picture/contrast control. If instead, the display turned gray all over without the picture becoming clearly visible, you have most likely just increased the black level/brightness control. We use the term "most likely" because these controls can be linked so that a major change in one can affect a noticable change in the other, so you have to use your judgement as to which is having the greater effect on the desired outcome. On displays with a single control, the control will be a picture/ contrast control.

Now, if you have a black level/brightness control, the trick is to adjust the black level/brightness properly so that you don't lose information in the shadows, then adjust the picture/contrast to give you the proper brightness of white for your viewing environment. In order to adjust the black level/ brightness, you need to be able to distinguish between true black of the display and the black of a 24-bit RGB 0,0,0 pixel. This is typically hard on LCDs because they don't have any unused mask area around the image area that you can compare to a black image put up on the display, so you just have to judge the black pixels to the thin black border around the LCD edges. However, most LCDs lack a black level/ brightness control so it is usually a moot point. On CRTs, there is typically an unused area around the image area (unlike television sets where the image is over-scanned and is masked by the bezel of the television chassis) that creates a clearly visible edge between itself and the image on the display. This allows you to put up a black image on screen and compare its brightness to the brightness of the unused area.

Again, if you have a black level/brightness control, use the "Make Display Black" feature or put a black image up on-screen. Then, raise the black level/brightness control until you can see a difference between the image area and the unused area, then lower the control until the difference goes away. At very low resolutions, you should be able to see "raster lines" or "scan lines" in the image area, but at higher resolutions, the image area will just appear to be a solid patch of gray. Realize that some displays (especially older CRTs) have hardware flaws that may never allow the black level/brightness to be raised enough. Also, on some displays, you may never be able to lower the black level/brightness enough. The ambient light level also has a significant effect on the black level/brightness, so if you are in a very brightly lit environment, you may not be able to raise it enough. Conversely, if you are in a very dark environment, you may not be able to lower it enough. Just do the best you can given the limitations or your hardware and environment.

After you have adjusted the black level/brightness, use the "Make Display White" feature or put up a white image up on-screen. Then, adjust the picture/contrast control until the brightness of white is at a comfortable level. If you are doing work for print, this should be the brightness of a clean sheet of white paper under normal viewing conditions.

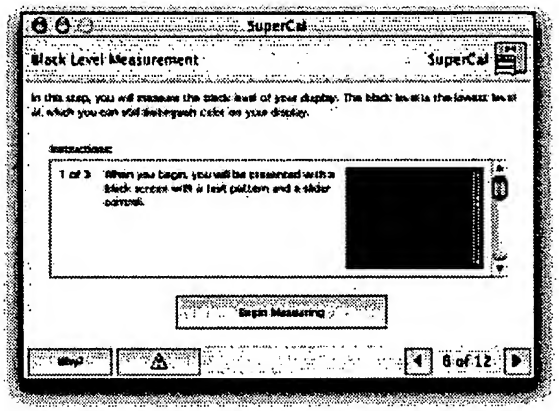
For more information on display adjustment, we highly recommend reading Brightness and Contrast Controls by Charles Poynton. It is an excellent description of the principles behind picture and black level adjustment and should read by anyone adjusting a display device like a computer monitor or television video monitor.

If you have a white balance, white temperature or color bias adjustment on your display, this is the proper time to use it instead of using the white balance available in Step 8. By using your display's color bias adjustment instead of the software adjustment available in SuperCal, you will insure that your display maintains the maximum possible brightness and you will eliminate the chance of any posterization occurring because of an overly compressed gamma table. It is always best to do as much adjustment as possible in hardware before you turn to software to correct the display. Once you adjust the display's color bias settings, you may ignore Step 8 because it would be redundant (unless you do not have enough adjustment in hardware and need to supplement it with the software adjustment).

If you do not have a white balance, white temperature or color bias adjustment on your display, you should proceed with the calibration and use the white balance adjustment in Step 8 instead.

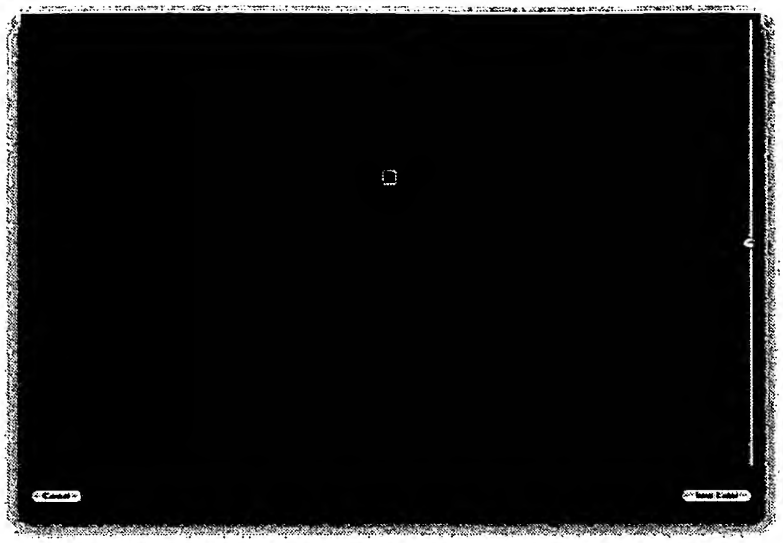
Step 6 - Black Level Measurement

The black level measurement step gives you brief instructions on how to perform the black level measurement and allows you to begin the process. When you are ready to begin, press the "Begin Measuring" button.



Important: If you are measuring an LCD on a laptop computer or have a first generation LCD for a desktop, it is important for you to keep your head stationary throughout the measurement process. Early desktop LCDs and most laptop LCDs typically have very poor off-axis response characteristics that cause the image to change dramatically in appearance when you move your head from side to side or up and down. Find your typical viewing position and hold your head stationary throughout the black level and response measurements. **Do not** move your head to make a pattern look different - use the supplied controls. It is impossible to overcome the off-axis response characteristics of the display, so you need to do the complete measurement from one position so that you insure uniform results. If you move, you **will** get variations in the measurements that will be seen as color tints in neutral grays.

The black level measurement screen has a single vertical slider that controls the brightness of all of the calibration patches. You should adjust the slider so that you can see the little square in the center, but you can no longer make out the pattern around it. This step can be very difficult, but it is very important. If you find it difficult to distinguish the difference between the patches, lower the slider and look away (without moving your head) then look back and see if you can find the center patch. If not, raise the slider a small amount and do it again. When you can locate the center patch without also seeing the pattern, you've got it.

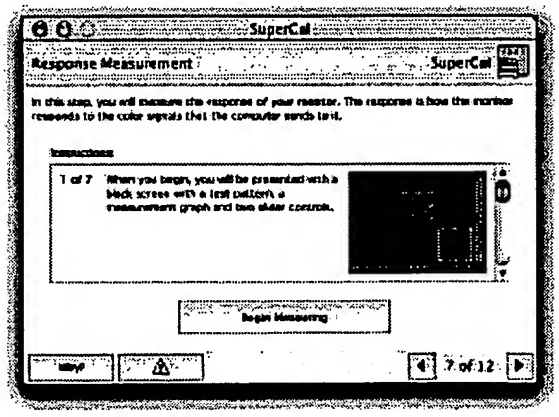


The black level determines the lowest luminance value that you can see. This is important so that the calibration can compensate for the dark shades that you cannot see, either due to an imperfect display or due to the ambient lighting conditions affecting the display. The darker the room that you're in and the lower the ambient light, the lower you will need to move the slider. This is because when it is dark, you can more easily see lower luminance values so the black level will be lower. When it is brighter in the room, the light overpowers the brightness of the display and washes out the shadows so you can no longer see the lower luminance values.

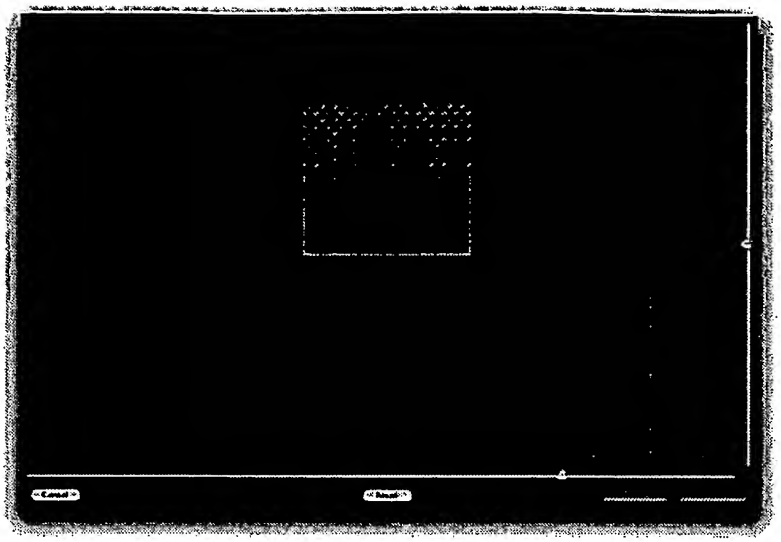
When you have completed this step, the button will be renamed "Re-Measure" to indicate that the measurement has been completed.

Step 7 - Response Measurement

The response measurement step gives you brief instructions on how to perform a response measurement and allows you to begin the process.

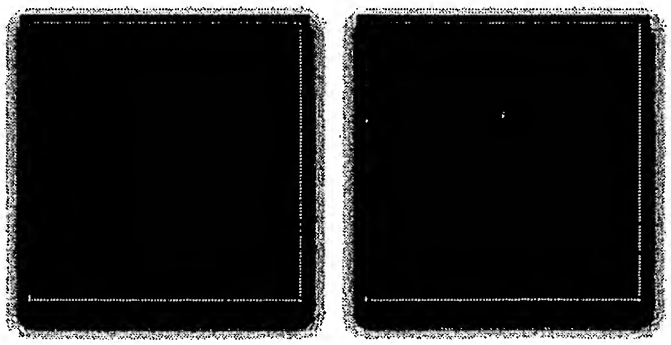


When you are ready to begin, press the "Begin Measuring" button. If you have not completed the black level measurement in the previous step, the button will be dimmed until you do so.

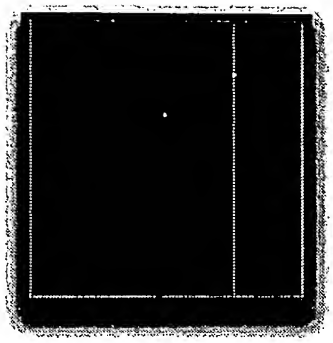


The response measurement screen has two sliders in it - one vertical and one horizontal. The vertical slider controls the brightness of the solid calibration patch, while the horizontal slider determines which color values are used to produce the pattern calibration patch. The basic idea is to adjust the brightness of the solid patch, making it lighter or darker, until it matches the intensity of the patterned patch adjacent to it. You will need to blur your vision by squinting or by focusing in the distance in order to make the patterned patch appear to be a solid, uniform intensity. Once you get the hang of it, it's relatively easy to do.

Initially, only the halfway (50%) point can be measured because there are only two known color values to make a pattern from - full intensity and black. Move the vertical slider until the two patches appear to be the exact same intensity. **A word of advice:** This first calibration point is the most important because later measurement points will be dependent on this first point. If you don't get it quite right here, the errors will magnify as you go along and the accuracy of the final profile will be reduced. Hold your head as still as you can throughout the measurements. Here's a tip: It helps to make a chin rest out of a stack of books.



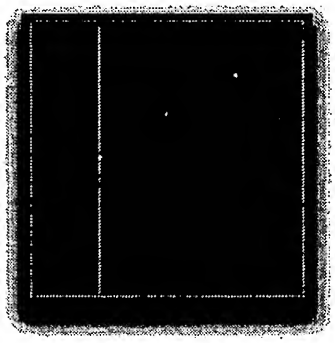
After adjusting the brightness of this initial point, **you must move the horiz slider to "accept" the value** and activate new calibration points. After doing this, you will get two new points.



The measured point will change to a small lock icon and new calibration points will become available, illustrated by gray vertical lines. Simply move the horizontal slider to the right to select the new points on the right. When you do this, the pattern will change in intensity because it will be using different intensities to make the test pattern. The "Next Color" button will also be activated, but don't touch it until you're finished with all the measurements for the current color.

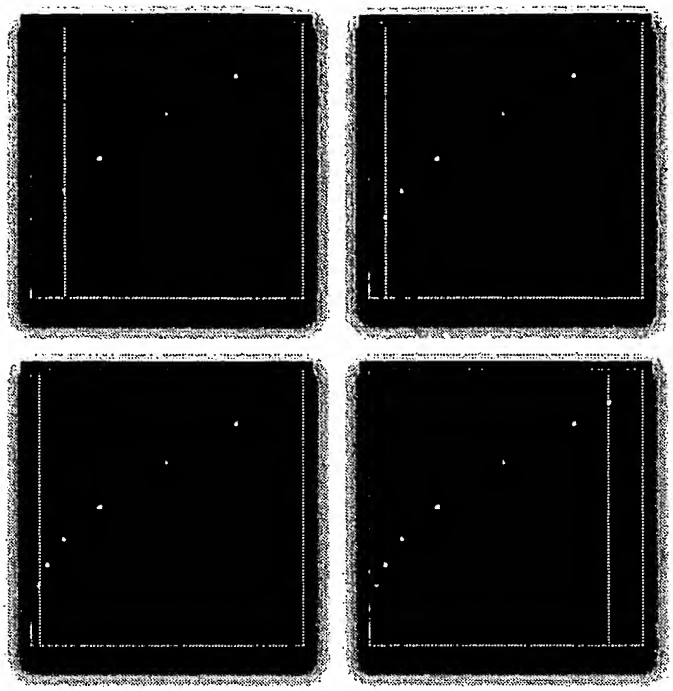
Again, move the vertical slider until the two patches appear to be the exact same intensity, then move the horiz slider to accept the value and activate additional calibration points.

After you measure these two points, you will begin to have a large number of points available to measure. Try to use the points that are spaced halfway between already measured points, not points that are immediately adjacent to measured points. This means that you should move to the point on the left that was available immediately after the first measurement, before you do any of the others.



Again, move the vertical slider until the two patches appear to be the exact same intensity, then move the horiz slider to accept the value and activate additional calibration points.

After you have measured these three points, you will repeat the process of selecting new points and measuring them. However, you do not need to measure every point. Rather, after you have measured a point, you should slide the horizontal slider left and right across the available points to see if the pattern produced at each one matches the solid color patch at each one. If they match, there is no need to measure that point. If it doesn't match, you should measure it.



On LCDs, you may find that you have to calibrate more points to the left of halfway, while you only need to calibrate one or two on the right, which is common. In addition, most displays can be measured very accurately with only 7 to 8 points.

When you find that the test patterns match at each of the available test points and you are finished measuring this color, press the "Next Color" button to go to the next color. Remember to keep your head in the same position throughout all of these measurements.

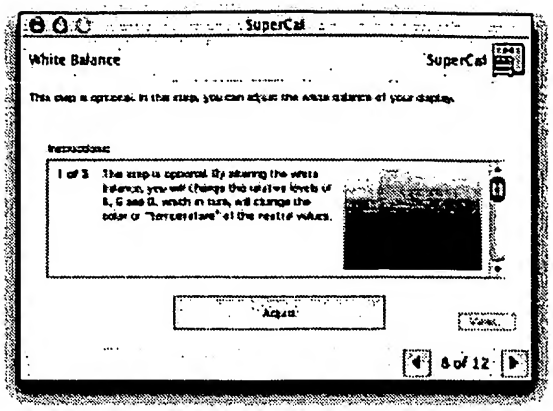
Here are a few tips to keep in mind:

- If you mess up a measurement or accidentally hit the "Next Color" button, you can always cancel and repeat the process.
- If you happen to move back to a point that has already been measured, the vertical slider will be deactivated because this point cannot be changed. If you wish to re-measure this point, you must use the undo button to undo any measurements that you did after this point.
- The graph in the lower right corner illustrates the amount that the values from the video card must be adjusted for you to see the visual intensity that is expected. By "expected", this means the brightness of the solid patch should match the average brightness of the pattered patch.
- As you measure points down in the shadows (to the left of center), you may see a warning appear on the graph if you need to make substantial adjustments. It is wise to pay attention to the way you are adjusting because it is typically operator error when this occurs, but it can also be the result of a display with a very poor response curve. If this happens, it means that the measurement point is causing the smoothed curve to be clipped. If you need to leave a point this way, step to a new adjacent point and measure it which will possibly pull that part of the curve back into bounds.

When you have completed this response measurement step, the "Measure" button will be renamed "Re-Measure" to indicate that the measurement has been completed.

Step 8 - White Balance (optional)

This step allows you to adjust the white balance. **This step is optional** and should not be used if you have already adjusted the hardware color temperature or color bias setting on your display at the end of Step 5. Adjusting the white balance is a very subjective step with the goal being to alter the color temperature of white so that any color hue is removed from what should be neutral values.



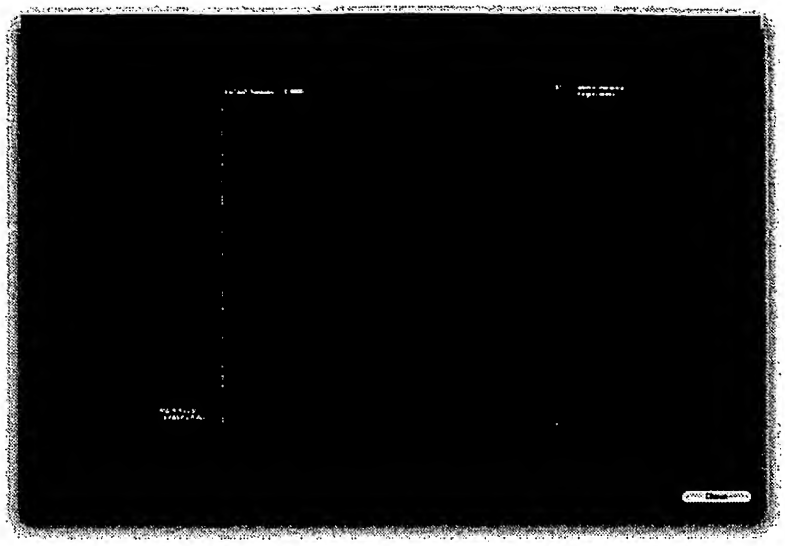
When you are ready to begin, press the "Adjust" button. If you have not completed the response measurement in the previous step, the button will be dimmed until you do so.

The current image is temporary. It will be updated in a future build.

After the user hits the "Adjust" button, a screen with an image is presented. Use the slider to adjust the display gamma to a point where the image looks acceptable (the default value of the slider is a gamma of 1.8). Don't worry about setting this slider to any specific value. It is merely there to allow you to adjust the image to an acceptable appearance to perform the white balance adjustment. You can adjust the gamma to a specific target value in the next step (FYI, the following target gamma step will reflect the value you set here).

Simply click the mouse anywhere on screen to change the white balance, or click and drag to see the changes in real-time. For most CRT and LCD displays, an acceptable white balance change occurs close to the center of the image. For displays such as projectors where the color temperature of the bulb produces very mediocre whites, an acceptable white balance change may occur near an edge of the screen.

The "Native" button will reset the white balance to its uncorrected value. The "Cancel" button will exit the adjustment without making changes. The "Done" button will exit the adjustment, saving the current setting.



Also present in the white balance adjustment step is a button for graphically viewing the current response curves. The "View" button will open a full-screen window and plot the correction curve that is applied to the display in order to make it perform according to the user's settings. The curve illustrates:

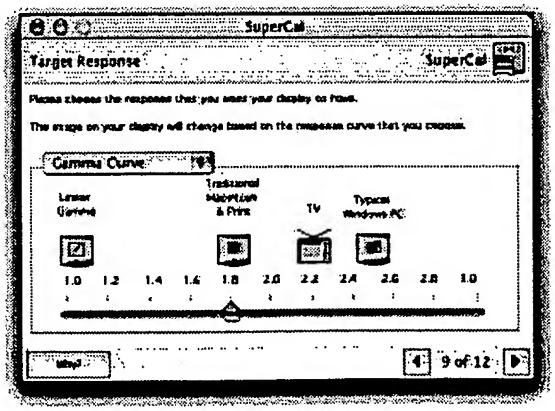
1. The amount of black level compensation applied to overcome losses due to ambient lighting
2. The amount of white balance adjustment that the user has requested
3. The correction levels applied to produce the desired display response (gamma)
4. The variations in the individual channel behaviors

This plot will reflect the gamma set in the white point pane or the gamma set in the next target response pane. The "Done" closes the window.

Again, this plot reflects the changes that must be made to the source signal to make the display perform as the user expects. It is not a plot of the resulting behavior of the display.

Step 9 - Target Response

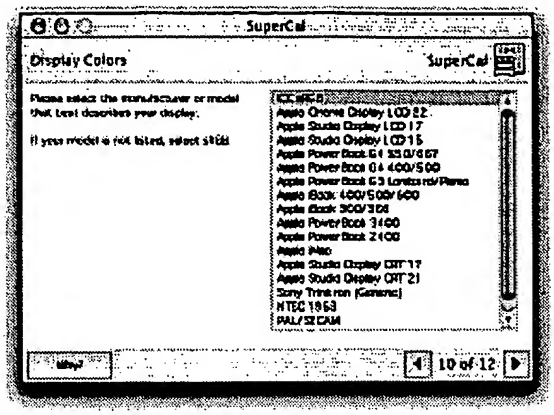
This step allows the user to specify the target gamma for this profile.



The target gamma is not relative to a particular kind of display device. For instance, you do not set a particular gamma because you have an LCD or because you have a projector. The target gamma is related to the type of content that you are creating.

Step 10 - Display Colors

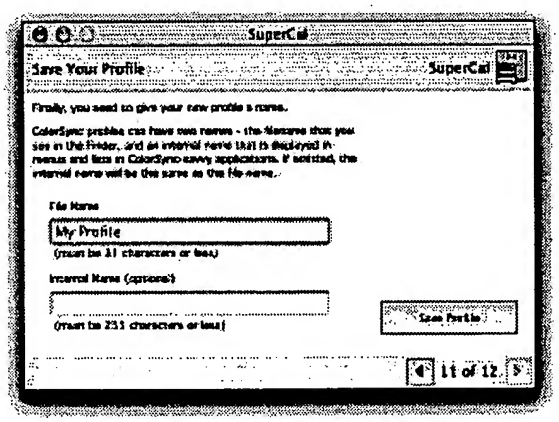
This step allows the user to specify the display type so that the proper chromaticity values can be written into the ColorSync profile.



Step 11 - Save Profile

This step allows the user to specify the file name and an optional internal name for the profile. The internal name may be different from the file name and is used in menus in ColorSync-savvy applications. Sometimes, due to file system restrictions, the file name may not be long enough to adequately describe the profile, so a cryptic file name is applied and a longer, descriptive internal name is supplied. This usually occurs when a manufacturer supplies cross-platform ICC profiles for Macintosh and Windows systems. Due to DOS file name restrictions, the profiles will typically have cryptic 8+3 character filenames, but a normal descriptive internal name that appears in menus of ColorSync-savvy applications.

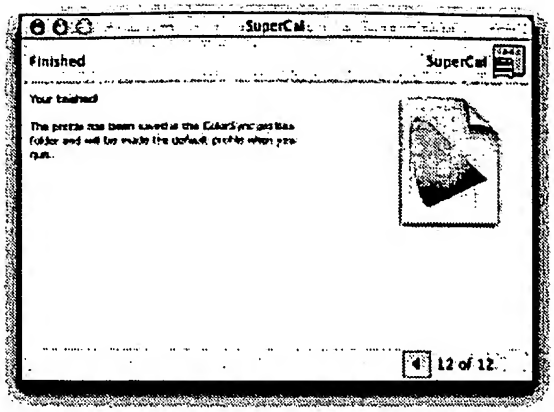
If you omit the internal name, it will automatically be set to the file name.



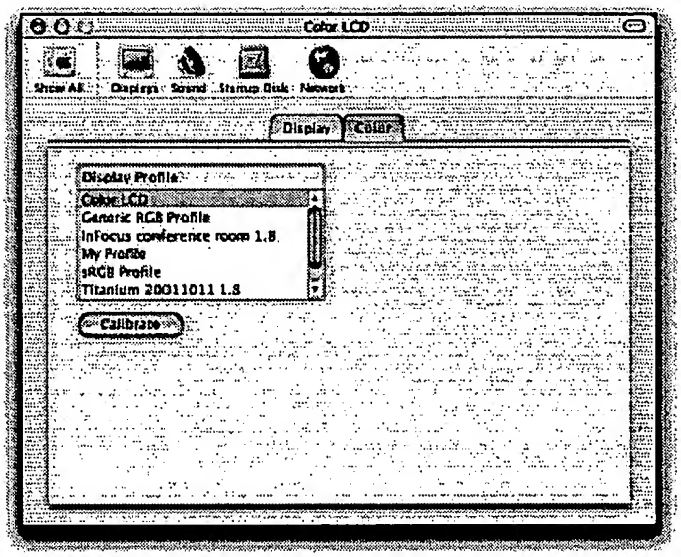
Your profile will be saved in the appropriate folder for your system version. In Mac OS X, the profile will be saved in the current user's ColorSync profiles folder located at ~/Library/ColorSync/Profiles. Under Mac OS 8.6 and later, the profile will be saved in the ColorSync Profiles folder in the System Folder.

Step 12 - Finished

This step informs the user that the process has been successfully completed. It will not be reachable until the profile has been saved. The profile you create will be made the default profile when you quit.



The profile you created will be made the default profile when you quit. To see this default profile setting or to manually change the default profile under Mac OS X, open the "System Preferences" and select the “Displays” option, then select the "Color" tab. Under Mac OS 9, open the “Monitors” control panel and press the "Color" button.



When you select a profile, you will notice your display change slightly in appearance. This is because profiles contain a corrective table that corrects for the inaccurate response characteristics of your display.

Frequently Asked Questions

I don't see raster lines on my display when adjusting the brightness and/or contrast. What gives?

Older, lower resolution CRT displays used to have visible raster lines (or scan lines as they were also called) formed by the rows of illuminated pixels and the thin dark rows between them where the electron beam didn't illuminate the phosphor on the picture tube. As CRT displays have increased in resolution over time, the rows of pixels have gotten progressively smaller and denser, and the thin dark rows between them have nearly vanished because of the precise focus of the electron beams in today's CRTs. The imageable area now just appears to be a continuous tone image. In addition, LCDs are a very different technology than CRTs and do not have raster lines.

SuperCal doesn't seem to be any better than Adobe Gamma. Why should I pay for this thing?

It all depends on what kind of display you have. If you have a really good CRT, you may see little difference between the results from SuperCal and the results from other visual calibrators. This is because other visual calibrators are designed to calibrate displays with response curves that approximate a power curve. The better your CRT, the closer its response will be to a smooth power curve and the better the calibration will be. Other displays like LCDs, projectors and less-than-perfect CRTs may have response curves with radically different shapes than a power curve, and as a result, the cannot be measured and calibrated with ordinary visual calibrators. This is where SuperCal far surpasses these other calibrators.

Why can't I edit and tweak the curves?

In a future build, you will be able to edit the curves after the display has been measured using the visual comparisons. This will allow you to correct any mistakes you made during the measurement process or tweak them to suit your subjective preferences. At the current time, you must use "Undo" during the process, or re-do the full response measurement. Yes it may seem tedious, but once you've done one full measurement, you should have the hang of it and be able to do subsequent error-free measurements in only a few minutes.

If I move my head, the screen really changes. How am I supposed to do a good job when this happens?

You really need to assume your normal viewing position and keep your head stationary throughout the measurement process. If you are seeing changes when you move your head up and down or side to side, you most likely have a PowerBook with an LCD display. PowerBook LCDs have very limited viewing angles, and no software or hardware solution can overcome this limitation. You will get the best results if you perform a very careful calibration from your typical viewing position. Try making a simple chin rest with a stack of books to make it easier.

Why does my display flicker sometimes when I start SuperCal?

This is an unfortunate visual blemish that occurs when SuperCal checks the video hardware to see what capabilities it has. SuperCal works by sending a table of numbers to the video card to adjust what colors the video card sends to the display. The odd display flicker happens when SuperCal sends a pattern of numbers to the card, then asks for them back to see if the card could remember them all. In some cases, when a table of numbers is sent to the video card, ColorSync intercepts the numbers and turns them into an equation (for some odd reason). If this equation is returned when Supercal asks for the numbers, it doesn't give SuperCal any information it can use. So, SuperCal sends a pattern of numbers that ColorSync cannot turn into an equation. The visual blemish is simply a very quick change of the red, blue and green colors on your display.

Why does my LCD display look funny where the pattern is in the measurement screen?

This can happen on LCD displays that are connected to the computer through an analog video connection. What is happening is that the analog video signal is being converted back to a digital signal by the display, but it is not being converted properly and produces visual artifacts on the display where "high frequency" images are being displayed, like single-pixel checkerboard patterns. You can usually correct the problem by adjusting what is typically called the "phase" setting in the hardware controls of your LCD display. For adjustment purposes, you can use the patterns in the measurement step or you can produce a single-pixel black and white checkerboard pattern in an image editing program like Photoshop and use it instead. Simply display the pattern and bring up the on-screen hardware controls and adjust the "phase" setting until the image is clear and stable.

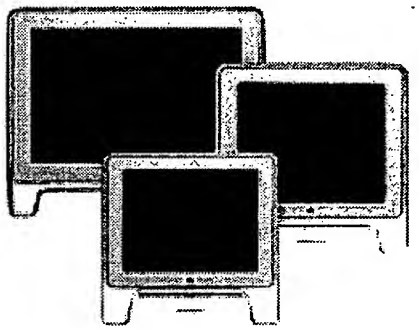
SuperCal

Introduction

SuperCal™

Welcome to the SuperCal Assistant.

SuperCal can calibrate any type of display device and generate a ColorSync profile for it.



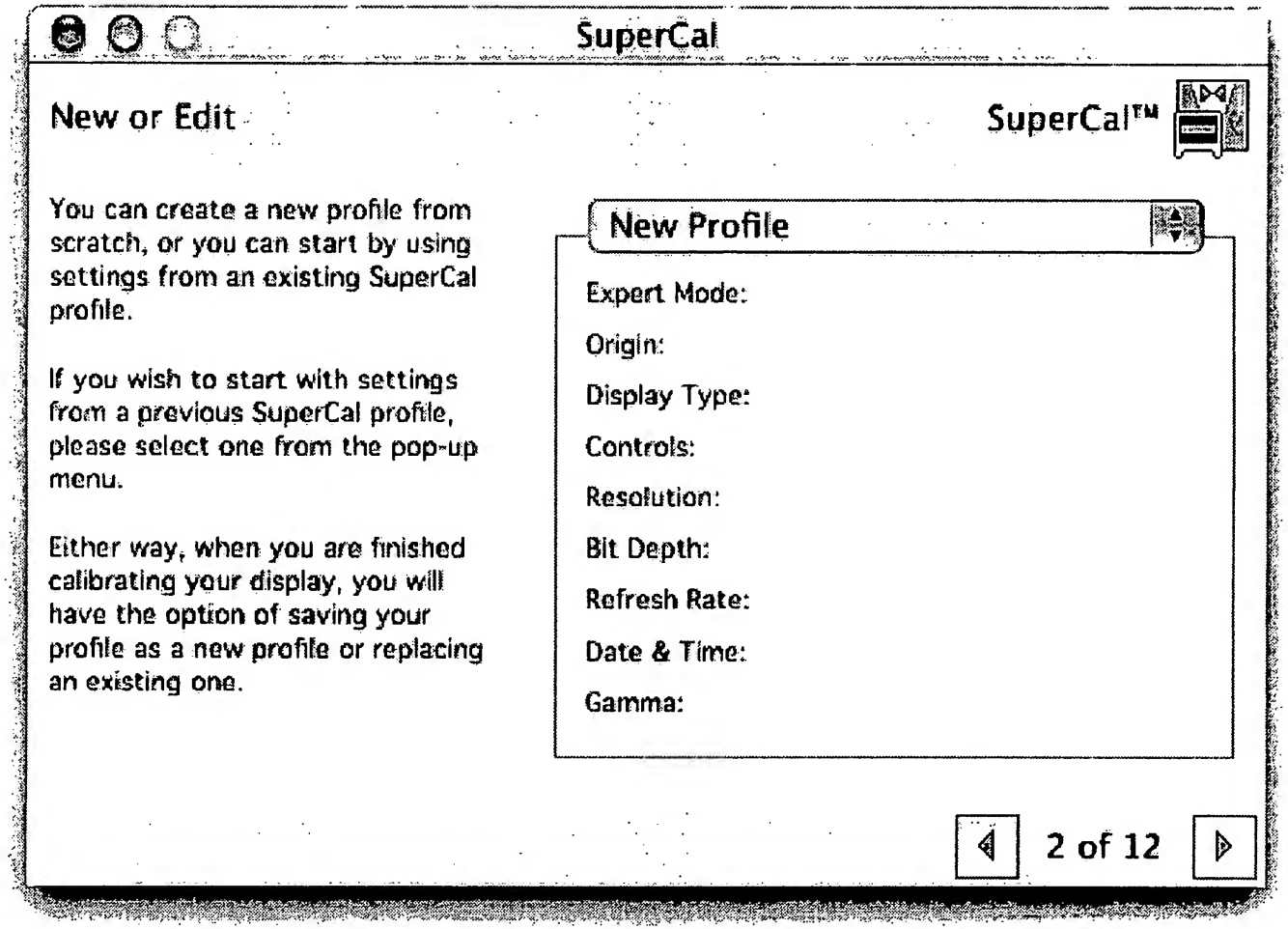
You will perform the following steps:

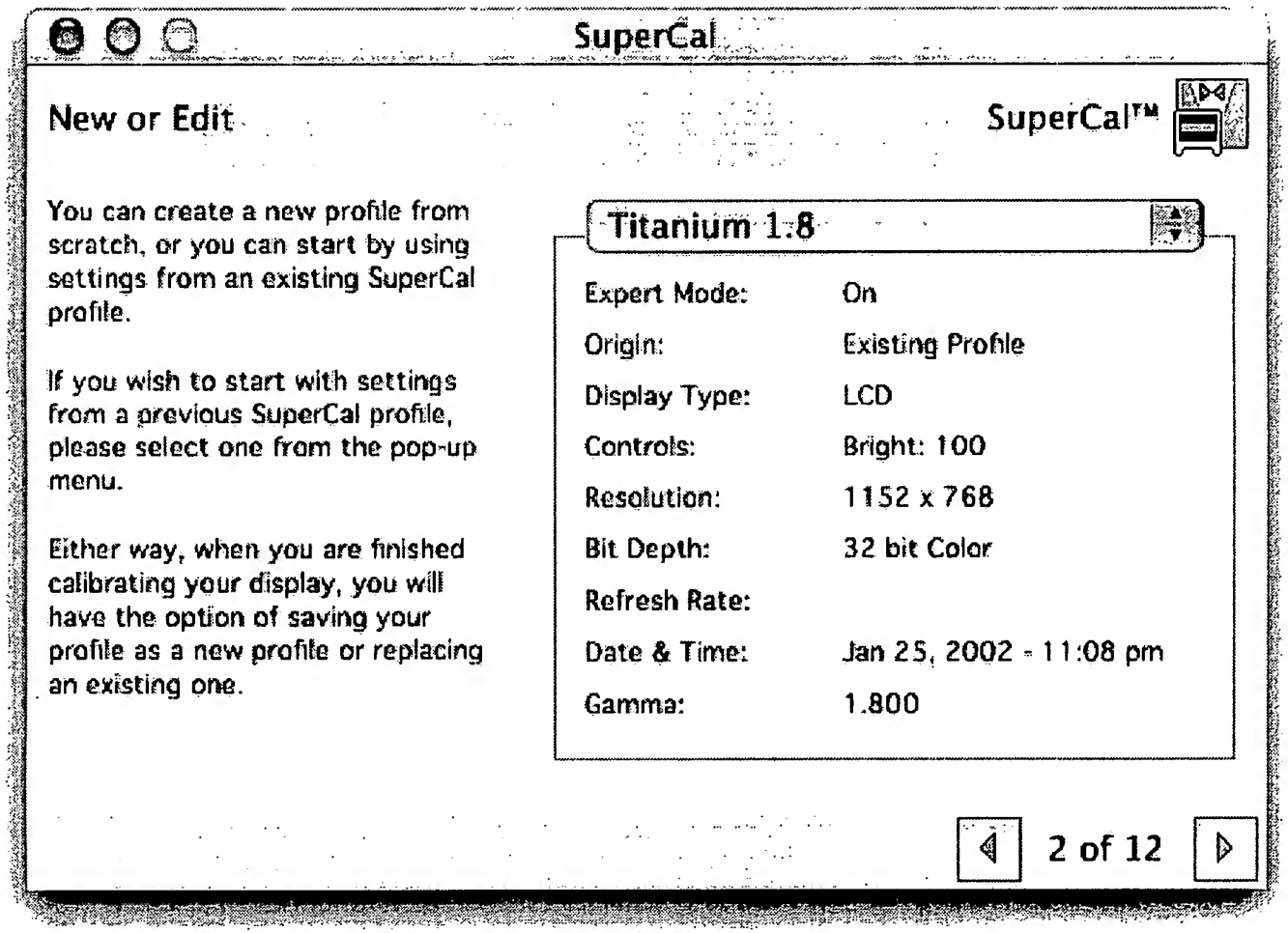
1. Choose a display type
2. Adjust the display
3. Measure the black level
4. Measure the response
5. Adjust the white balance
6. Select a target response
7. Identify chromaticities
8. Save the profile

☑ Expert Mode

Remember, SuperCal is shareware. If you find it useful, please register your copy through Kagi Shareware at https://order.kagi.com/?9KE.

1 of 12 ▷


SuperCal
New or Edit
SuperCal™
You can create a new profile from scratch, or you can start by using settings from an existing SuperCal profile.
If you wish to start with settings from a previous SuperCal profile, please select one from the pop-up menu.
Either way, when you are finished calibrating your display, you will have the option of saving your profile as a new profile or replacing an existing one.
New Profile
Expert Mode:
Origin:
Display Type:
Controls:
Resolution:
Bit Depth:
Refresh Rate:
Date & Time:
Gamma:
2 of 12

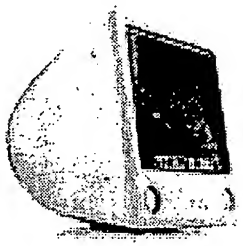

SuperCal
New or Edit
SuperCal™
You can create a new profile from scratch, or you can start by using settings from an existing SuperCal profile.
If you wish to start with settings from a previous SuperCal profile, please select one from the pop-up menu.
Either way, when you are finished calibrating your display, you will have the option of saving your profile as a new profile or replacing an existing one.
Titanium 1:8
Expert Mode: On
Origin: Existing Profile
Display Type: LCD
Controls: Bright: 100
Resolution: 1152 x 768
Bit Depth: 32 bit Color
Refresh Rate:
Date & Time: Jan 25, 2002 - 11:08 pm
Gamma: 1.800
2 of 12

SuperCal

Display Type

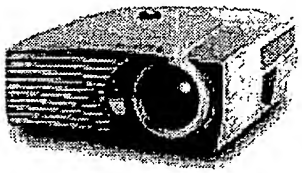
SuperCal™

Please select the type of display that you are calibrating.



○ CRT

◉ LCD

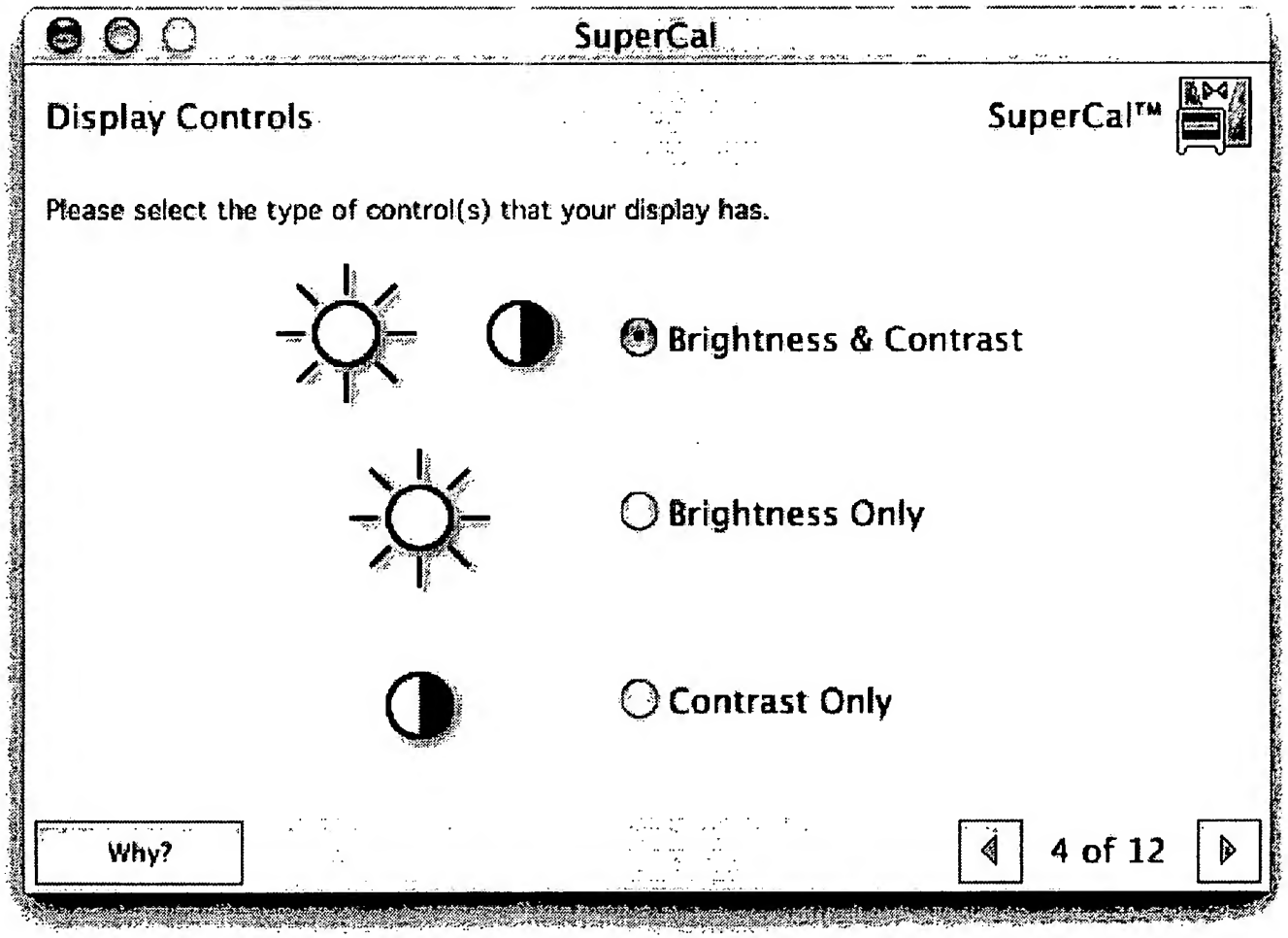


○ Projector

SuperCalibrator uses the display type to customize the measuring process and display optional information where it is appropriate.

Why?

◀ 3 of 12 ▶


SuperCal
Display Controls
SuperCal™
Please select the type of control(s) that your display has.
Brightness & Contrast
Brightness Only
Contrast Only
Why?
4 of 12

SuperCal

Control Adjustment

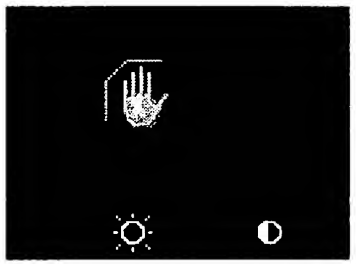
SuperCal™

Before you calibrate, you should make a few adjustments to your display to maximize the range of colors and brightness that your display can reproduce.

Instructions:

1 of 6 · Read through these steps completely before beginning to adjust your display.

You will not be able to read items on the display during some of the adjustment steps.



Make Display Black

Make Display White

5 of 12

SuperCal

Black Level Measurement

SuperCal™

In this step, you will measure the black level of your display. The black level is the lowest level at which you can still distinguish color on your display.

Instructions:

1 of 3 When you begin, you will be presented with a black screen with a test pattern and a slider control.

Begin Measuring

Why?

6 of 12

SuperCal

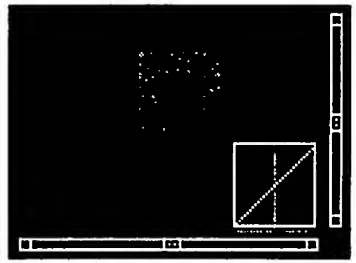
Response Measurement

SuperCal™

In this step, you will measure the response of your monitor. The response is how the monitor responds to the color signals that the computer sends to it.

Instructions:

1 of 7 When you begin, you will be presented with a black screen with a test pattern, a measurement graph and two slider controls.



Begin Measuring

Why?

7 of 12

SuperCal

White Balance

SuperCal™

This step is optional. In this step, you can adjust the white balance of your display.

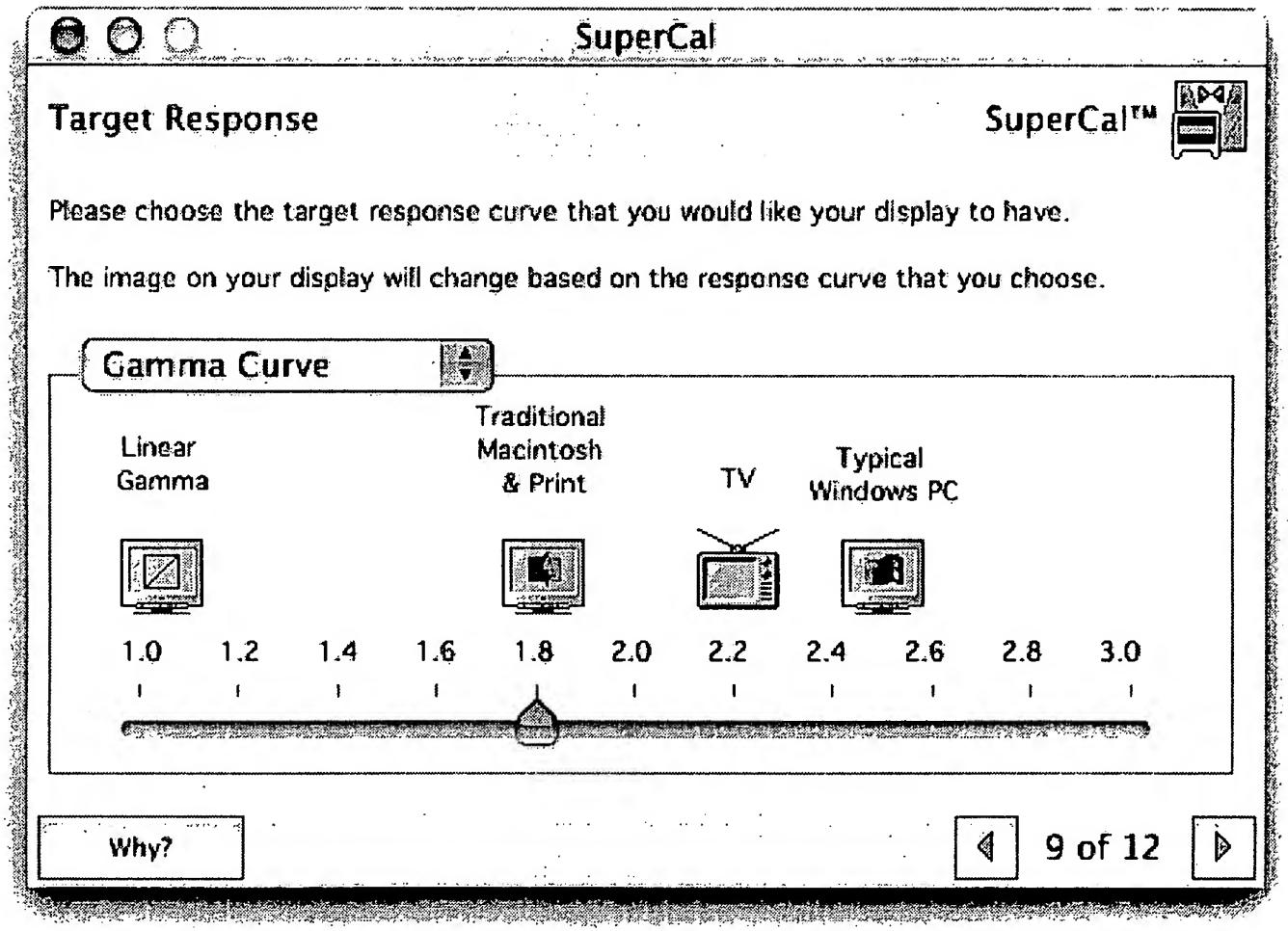
Instructions:

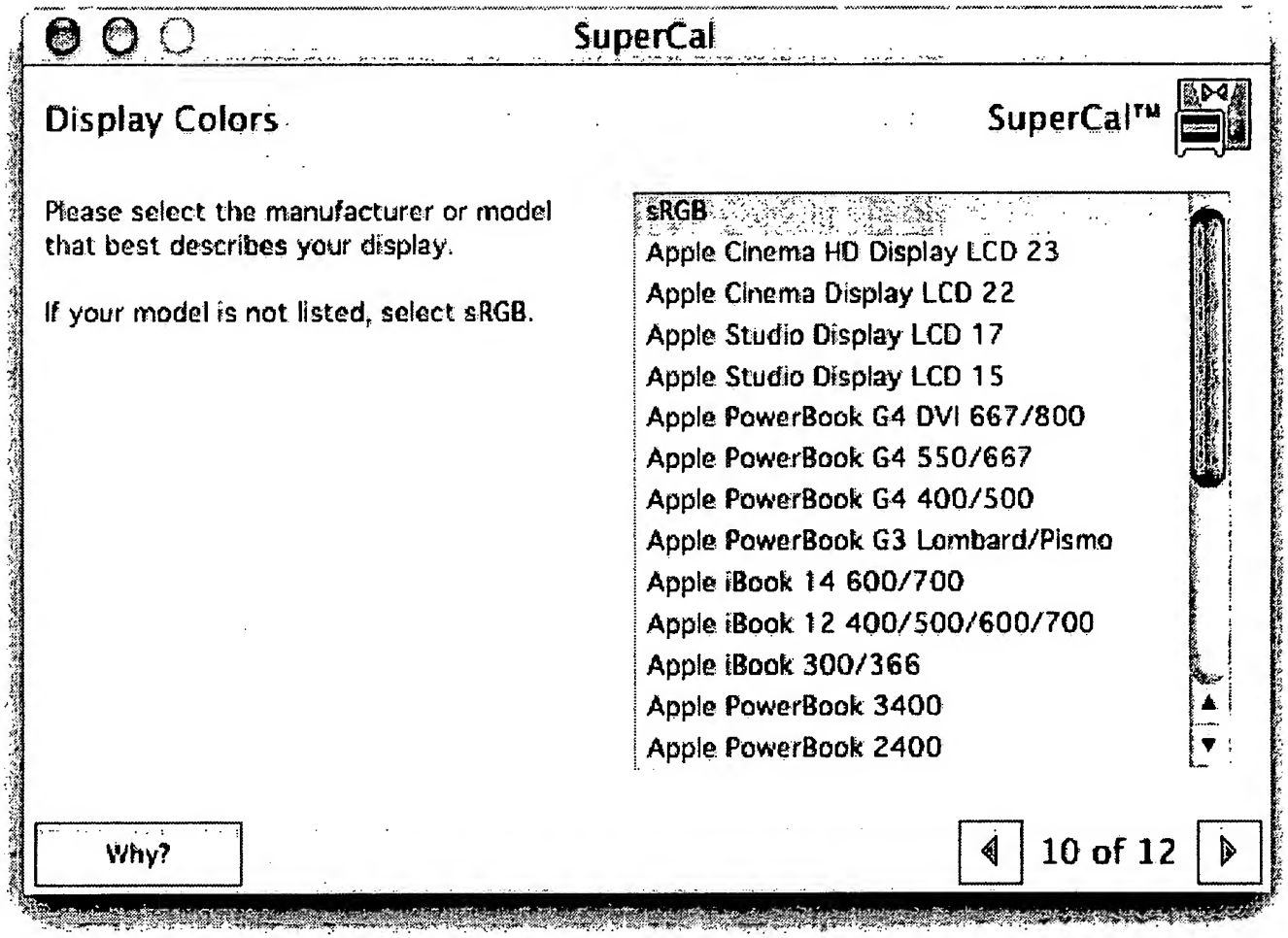
1 of 3 This step is optional. By altering the white balance, you will change the relative levels of R, G and B, which in turn, will change the color or "temperature" of the neutral values.

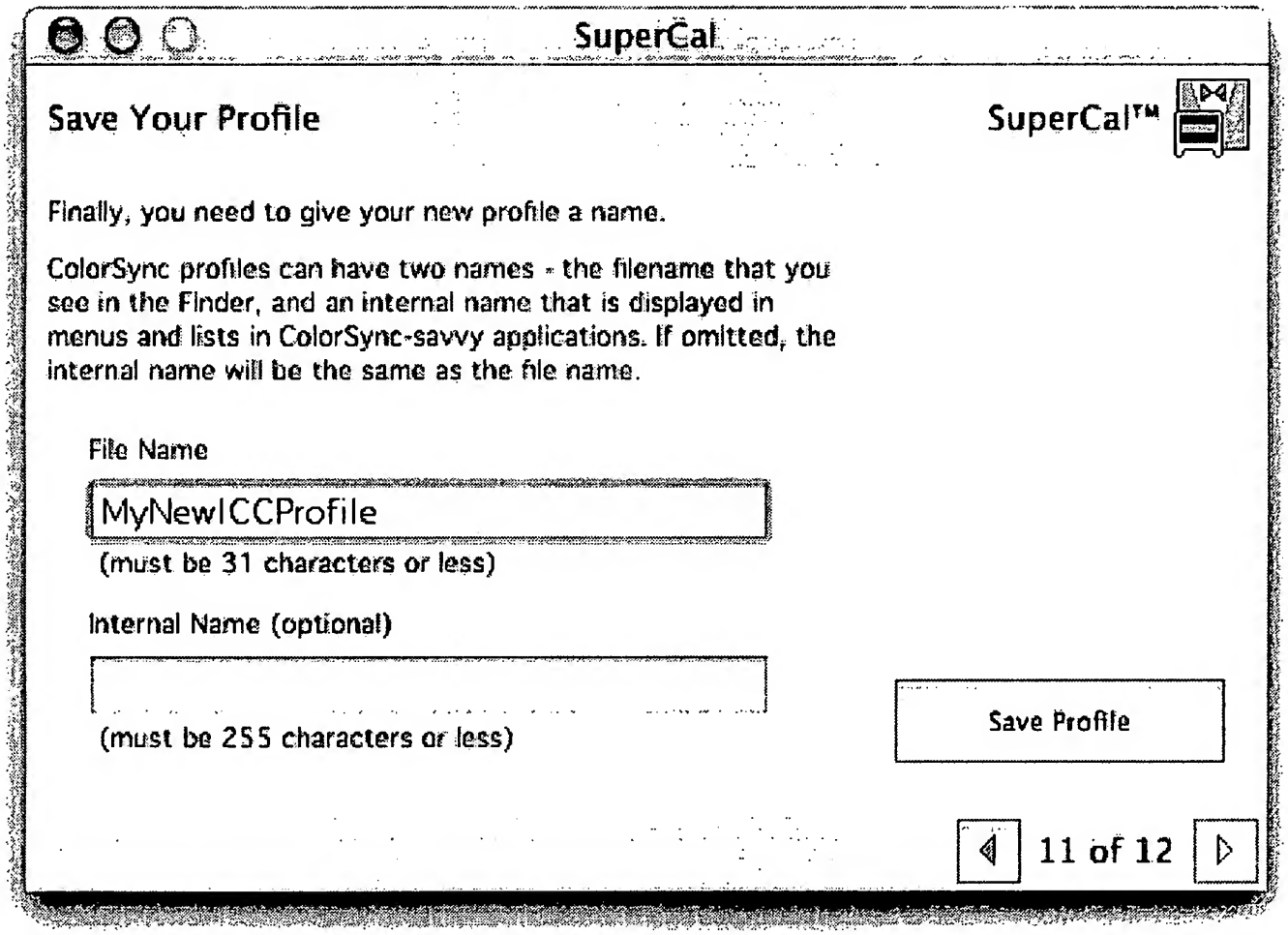
Adjust

View...

8 of 12


SuperCal
Target Response
SuperCal™
Please choose the target response curve that you would like your display to have.
The image on your display will change based on the response curve that you choose.
Gamma Curve
Linear Gamma
Traditional Macintosh & Print
TV
Typical Windows PC
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
Why?
9 of 12


SuperCal
Display Colors
SuperCal™
Please select the manufacturer or model that best describes your display.
If your model is not listed, select sRGB.
sRGB
Apple Cinema HD Display LCD 23
Apple Cinema Display LCD 22
Apple Studio Display LCD 17
Apple Studio Display LCD 15
Apple PowerBook G4 DVI 667/800
Apple PowerBook G4 550/667
Apple PowerBook G4 400/500
Apple PowerBook G3 Lombard/Pismo
Apple iBook 14 600/700
Apple iBook 12 400/500/600/700
Apple iBook 300/366
Apple PowerBook 3400
Apple PowerBook 2400
Why?
10 of 12


SuperCal
Save Your Profile
SuperCal™
Finally, you need to give your new profile a name.
ColorSync profiles can have two names - the filename that you see in the Finder, and an internal name that is displayed in menus and lists in ColorSync-savvy applications. If omitted, the internal name will be the same as the file name.
File Name
MyNewICCProfile
(must be 31 characters or less)
Internal Name (optional)
(must be 255 characters or less)
Save Profile
11 of 12

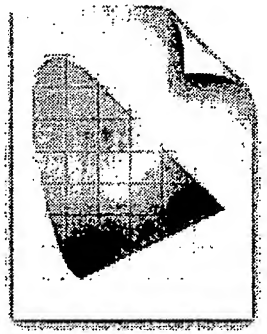
SuperCal

Finished

SuperCal™

You're finished!

The profile has been saved in the ColorSync profiles folder and will be made the default profile when you quit.



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